Buchanan (A. H.)

AN ADDRESS

ON

Scientific and Practical Medicine,

DELIVERED BEFORE THE

MEDICAL CLASS,

NOVEMBER, 1857,

BY

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CORRESPONDENCE.

NASHVILLE, November 16th, 1857.

PROF. A. H. BUCHANAN:—*Dear Sir*—The undersigned have been appointed a Committee by the Medical Class of the University of Nashville, to express their high appreciation of your very interesting and instructive Introductory Address, delivered before them at the opening of the present Term, and earnestly solicit the privilege of publishing the same.

Most respectfully yours,

EUGENE HENDERSON, Tenn., Ch'n.
J. E. JOSEY, Miss.,
A. BROOKS EVERETT, M. D., Va.,
A. P. WATERFIELD, Ky.,
J. CALHOUN, Geo.,
N. U. SMITH, Ark.,
J. W. CLARDY, Florida,
J. W. VAUGHN, Mo.,
U. M. BOATWRIGHT, S. C.,
R. D. BONE, Texas,
W. C. BROWN, N. C.,
T. M. CAVETT, La.,
W. J. STANFORD, Ala.,
W. W. CAMPBELL, C. Nation.

NASHVILLE, November 18th, 1857.

GENTLEMEN:—I have received your very complimentary note requesting for publication my Introductory Address. It affords me pleasure to comply with your request, although I am aware you greatly over estimate its merits.

Very Respectfully yours,

A. H. BUCHANAN.

To Messrs. EUGENE HENDERSON, Tenn.,
J. E. JOSEY, Miss.,
A. BROOKS EVERETT, M. D., Va.,
A. P. WATERFIELD, Ky.,
and other gentlemen of the Committee.

ADDRESS.

GENTLEMEN:—The opening of the Medical Colleges of the country is an occasion of exciting interest, at least to Professors and Students. The youthful heart and ambitious aspirations of the students, so manifest in all their acts, looking to the future with high hopes of success, bring back to the mind of the Professor vivid recollections of his own college days, and remind him of his early struggles and anxious desires and misgivings, at the thought of compassing the great science of medicine. I well remember, when like some of you, I listened for the first time to a medical lecture, and how much I was interested in the discourse of the eloquent Samuel Jackson, of the University of Pennsylvania, and how deeply he impressed upon all his hearers the importance, the usefulness and true dignity that belongs to medical science. No department of human knowledge, no occupation, trade or profession, since the earliest records of time, has done so much to ameliorate the condition and contribute to the perfection and happiness of the human race, as medicine. In all ages and in all countries it has been justly regarded as the most useful and benevolent of all professions. And its cultivators, who spend their lives in extending the boundaries of human knowledge, and directly contributing to the relief of the diseased and afflicted, have won for themselves not only pre-eminence in erudition and science, but also honor and gratitude for dispensing health and happiness among their fellow men. So highly were the physicians of old appreciated,

that their avocation was regarded as being more propitious to the gods than any other. Thus we find one of the greatest of the Romans to say, in speaking of physicians: "Homines ad Deos nulla re proprius accedunt quam salutem hominibus dando." (Men in no particular approach so nearly to the gods, as by giving health to their fellow men.) In more recent times an eloquent writer asks, "who disarms pestilence of its powers, and gives Jenners to the world?" And may we not ask who has made painless the surgeon's knife, and lulled to sleep the sensibility of the soul while its blade is made to pass through the most sensitive tissues of the body? Well has it been said, "The servant of religion hath not more of true sanctity about him than the good physician." You see then, gentlemen, that the noble and honorable profession, in the study of which you are now engaged, is not surpassed by any other in advancing the great cause of humanity. From the time of Hippocrates to the present moment, the study of medicine has occupied the attention of many of the greatest intellects and most profound philosophers who have ever lived. And its deep and intricate laws are so intimately connected with every department of science, that it may be truly said to embrace a knowledge of all nature, extending through all the inorganic as well as organized creation up to man, who is its especial study. A science then, so complicated in its relations, and so boundless in extent, when considered in its totality, cannot be acquired or improved in all its various departments by any one man, however great may be his genius, or ardent and devoted his studies. But it is the work of many, and hence medicine proper, even as restricted to man, being in a great degree dependent upon the advancement of the collateral sciences for its own improvement, cannot be expected to make more rapid strides to perfection than the world has already witnessed. We are sure, however, it has advanced *pari passu* with the other sciences, although we are free to confess it is far from perfection, either as a science or an art. But the same is true with regard to all other departments

of science, if perhaps we except that of mathematics. Too much has always been expected of medicine, for notwithstanding it is well known that man is born to die, and that his age on this earth is limited to three-score years and ten; yet medicine is deemed imperfect because it does not prolong human existence almost indefinitely, and because the lives of little ones are not saved, who, in accordance with nature's laws, are doomed to an early death. Conscious, then, that we are engaged in the noblest of all studies, and are yearly adding to the general stock of medical knowledge, we will call your attention to the especial object of our discourse, which is the consideration of

SCIENTIFIC AND PRACTICAL MEDICINE.

From what has already been said, it is clearly evident that no one whose education is not both classical and scientific, can ever hope to reach the highest rewards which await the profound and accomplished scholar, who devotes his whole time and talents to the investigation of medicine. You, who are here to-night, the representatives of so many of the free and enlightened States of our great confederacy, are both highly and indifferently educated; some are classical and scientific scholars, graduates of learned universities. Others are but youths from the mountains and valleys of the country, with no other education than such as they have obtained within the walls of a log cabin, consisting chiefly of English Grammar, Geography and Arithmetic. Yet we say to each and every one of you, welcome to the halls of our medical college. He who can win her honors shall have them, whether he be of lowly birth or high estate, college or country bred; if he comes up to her high requisitions, with equal pleasure each shall receive his reward. The youth, here to-night without a liberal education can, if he will, become competent in due time, to claim our highest honors. However much he might be facilitated in his progress by a good preliminary education; by a knowledge of the Latin, Greek and French languages and of the sciences; yet in the lan-

guage of the learned Dr. Latham of the Royal College of Physicians of London, we express our own opinion. He says, "You may recommend that every man before he enters upon the study of physic should obtain the best education in his reach; but you must specify *nothing* as *absolutely necessary*, but what bears immediately upon professional use." We do not desire to discourse on preliminary education, nor is it our intention. Much has been said and written on this subject of late by the profession. Learned reports and discourses have been made by various committees of distinguished gentlemen, to the American Medical Association, defining the *lowest* standard which should be *required* of a young man about to commence the study of medicine. We must confess that this standard appears to us to be low enough, and sincerely wish that all who study medicine were possessed of it. Yet, although we feel confident there are many here to night, who have not even this limited education, and regret that it is generally so defective throughout our whole country; still, there are so many examples of great and illustrious men, not only in medicine, but in all the learned professions, who have by their own exertions, after struggling uneducated for many years with poverty and misfortune, ultimately conquered all difficulties, and left behind such imperishable monuments of their fame, that we would say to those who are defective in education, go and read the lives of such men, of Hunter, of Godman, Beclard, and hundreds of others, and then go and do likewise.

We will not turn you away from our scientific halls because you are *now* uneducated; but we hold up to you her honors, and say you can have them. But you must win them fairly; and whether it requires you to study three years, or five years, the time will be well spent. Again, we cannot make you learned men; you must learn yourselves. We can teach you how and what to study, and direct and aid you in your course. But if you would be wise, you must think and study for yourselves. If your general education is defective, you must improve it;

you are young enough to do so, and if you are at all ambitious and devoted to your studies, you can succeed. Let no tame submission to adverse fortune or poverty obstruct you in your course, but work with zeal, energy and perseverance; let your motto be the old college one, *Labor omnia vincit*, and you will be sure of success. We cannot but believe that within the sound of our voice there are many young men, who can and will, whether now educated or not, conquer all difficulties as has been done before, and elevate themselves to high distinction. Let me impress upon you, if you would be a man of learning, and desire to rank high in your profession, you must learn yourself; you must study; long ago this has been inculcated. Says an ancient author: "We can make majors and officers every year, but not scholars. Kings can invest Knights and Barons — universities can give degrees — and the people can make high officers of State; but we, nor they, nor all the world can give learning, make philosophers, artists, orators, or poets." Great attainments and learning in medicine, or in any department of science or literature, can be acquired only by long and persevering study.

> "He that desires this wished goal to gain,
> Must sweat and freeze before he can attain,
> And labor hard for it."

So did Seneca, the philosopher, who said: "Not a day do I spend idle; part of the night I keep mine eyes open, tired with waking, and now slumbering to their continued task." The great John Hunter slept but four hours in the twenty-four, and was always actively engaged in the pursuit of knowledge while awake. Our own countryman, Godman, studied even on his sick bed, and hundreds of examples might be cited to show how great and endless is the labor of him who would grow truly wise, even in one department of knowledge. Think not then that what is called genius, without application, will ever make you learned in medicine, or that any scientific or literary

attainments will teach you medical science; such, however accurate and extensive, are but the pre-requisites by which your medical studies will be facilitated. Medicine embraces a knowledge of the collateral sciences, each of which to some extent must be understood in order to make successful progress in its study. And, indeed, even when aided by such general attainments, any one of the special departments of medical science, as Anatomy, Physiology, or Pathology, if studied with a view of obtaining a complete and accurate knowledge of it, will occupy a whole lifetime. The celebrated Haller estimated that it would require twenty years to become perfect in Anatomy. And so of Physiology or Pathology. But fortunately for you it is not requisite, as we shall hereafter show, that you should be so *very* perfect in any of the elementary branches of medicine, in order to become *able* and *judicious* practitioners. We shall presently endeavor to show, that although scientific and practical medicine are intimately connected, and should be studied together; yet, that practical medicine, in which of course we include surgery, though based upon *anatomy*, is chiefly dependent upon *observation and experience* in the use of therapeutic agents for its present advanced state of usefulness and certainty. However accurate and extensive your knowledge of Anatomy, Physiology or Pathology may be, it does not teach you the therapeutical effects of medicines. The effects of these must be learned by experiment, observation and experience. This then constitutes the subject of our discourse. You ought not to devote all your time to *scientific* or *elementary* medicine, nor rely upon observation and experience *alone* for *practical* information, because *correct* observation and experience can only be made in connection with, and based upon scientific knowledge. Now, it is with these views, and upon this basis that we will proceed. Let us illustrate more clearly. The Professor of Anatomy demonstrates to you with a sufficient degree of minuteness and accuracy the organs of an extremity, consisting of bones, membranes, muscles, cellular, adipose and dermoid

tissues, together with the arteries, veins, nerves and absorbents, etc., which constitute its anatomical structure. He is now followed by the Professor of Physiology and Pathology, who explains the functions and vital properties of these several parts, as well as the pathological changes which occur in their structure. This is purely scientific or elementary medicine. But now comes in the surgeon, and he gives you a *practical* demonstration of the value of the information you have just obtained. Suppose it to be an incurable disease of the elbow joint or fore arm, and it becomes necessary to amputate the arm. The patient is brought before yon, the disease is explained, and the surgeon will say,—this is an incurable disease, the arm must be amputated. It was once a very painful operation, but now it is performed without pain. We will put this patient to sleep, and in a few moments by the use of chloroform he is insensible to pain, and now as the surgeon wields his knife, based upon anatomical knowledge and experience, and subsequently dresses the wound he has made by ligating the arteries and closing up the cut surfaces, you, who are lookers on, can well see and appreciate the true connection and value of scientific and practical medicine. It must be apparent that the surgeon, in order to perform his *practical* duty, rests upon his anatomical, physiological and pathological science, and I will now add observation and experience. For until experiment and observation taught the celebrated Ambrose Pare, about the middle of the sixteenth century, the physiological effects of ligating an artery after amputation, no *à priori* reasoning based upon anatomy or physiology could have decided with certainty what would be the result of such an operation; and it is said to have cost this daring experimenter many restless and anxious hours before he was satisfied of the result. Nor was it until after reiterated observation and experience that the fact was established and the practice adopted. During all this time its distinguished author, like Harvey, Jenner, and all others who have made great discoveries in medicine, was abused and persecuted by his

jealous brethren. This great discovery, or as some will have it, revival of the use of the ligature, proving so successful and useful to humanity, marked an era in the history and progress of medicine far in advance of the practice prevalent at the time, which consisted in searing the cut and bleeding surface with hot irons to arrest the hæmorrhage. Here then, you see, that by observing the results of this experiment, not only practical, but *scientific* medicine was advanced. We learn the important practical fact, that to ligate an artery, not only will the hæmorrhage be arrested, but the physiological fact that while the tunics of the artery yield to the pressure of the ligature at the point of ligation, its vital and conservative powers heal and obliterate to a certain extent its structure, and thus presents a permanent band to any further transit of blood. We might go on to show, how the observation of these facts have led on through Hunter, Jones, and many others, physiologists and pathologists, to our present greatly advanced state of knowledge on all these points. But this you will learn in the lecture rooms from various sources. See then the contrast. In the middle of the sixteenth century the extremity was amputated by knife and fire with horrible pain, and usually proved *fatal* from suffering and hemorrhage. Now, it is amputated while the patient sleeps, without pain or hemorrhage, and the patient usually *recovers*. Who then will say medicine does not progress. The circulation of the blood was not known till the time of Harvey, and vaccination was not known till the time of Jenner. Who can count the thousands of lives that have been saved by these discoveries? Who can estimate the value of medicine to the world?

But let us not lose the thread of our discourse. It is, that scientific and practical medicine must go together. Suppose then you know the practical fact that you can arrest the hemorrhage of a wounded and bleeding artery by ligating it, and you are called on to do so, but suppose the artery is deeply seated, and in connection with large veins and important nerves, the

injury of which might prove fatal if wounded in your attempt to ligate. How can you safely proceed in this case except from an intimate acquaintance with the anatomy and physiology of the parts, in other words, except from a scientific knowledge of the parts. It is evident in this case that practice rests upon science, and is governed by it. But this is not all — you must not only know what is the matter and how to remedy it, but in order to be expert and practical you must have experience.

It has indeed been well said by an able observer and author that "the experience of other men will not supply the want of our own observation, for even *facts* must be tried and pass through our own thoughts and experience before they can be of much use to us."

Sir William Temple observes: "Though a man may grow learned by other men's thoughts, yet it is from his own thoughts as well as experience that he will grow wise."

Think not then, gentlemen, that however clearly and beautifully may be presented to your view, and illustrated before you, the wonderful and intricate structure of the human body, that it is sufficient to make you an anatomist. This is but an introduction to your task, well calculated, we admit, to excite your admiration and desire to prosecute with energy so wonderful and recondite a study.

But, if you would be wise in anatomy, as above intimated, you ought not and will not be satisfied with other men's thoughts and explanations, but with the knife in your own hands you will proceed quietly and cautiously, with its cutting edge as well as pointed handle, to unfold the beautiful and intricate structure of the human body. And as you progress each touch of the knife will bring before your admiring gaze something never before seen, and, like the excited geologist, or astronomer, or restless traveler, you go on, not with your weary task, but with interest in the exploration of the new and unknown structure before you. And which now being revealed by your own hand, seen, felt, handled and realized, you acquire by

your own experience, lasting and permanent knowledge which is your own, and which is the only way to acquire it. "Nihil est in intellectu quod non fuerit in sensu," was the motto of a celebrated philosopher.

In the prosecution of your anatomical studies it is not only necessary to dissect each organ and tissue of the body separately, but to examine and compare their relations collectively, so that the one or other organ may be a guide to you in any surgical operation of a dangerous character that it may become necessary to perform. And further, by thus dissecting yourselves, and comparing the relations and connection of parts, you are naturally led to inquire and reflect upon the varied use and more intimate structure and organization of the different organs, and thus, imperceptibly, become to some extent physiologists; for physiology is but a knowledge of the functions or actions, and vital properties of the organs of the body. But before you can fully appreciate or study to advantage the physiology of an organ, we must become more intimately acquainted with its minute or microscopical structure and organization. The mere outline or coarse anatomical structure and relations of the different organs, so important and essential to the practical surgeon, is not sufficient to satisfy the inquisitive mind of the physiologist. For although we cannot, as already stated, generally infer the functions of an organ from any knowledge however accurate it may be of its minute structure, yet it cannot be denied that such information, and the prosecution of such studies have greatly advanced us in our physiological researches, and in some instances, at least, have enabled the anatomist to infer the functions of organs from their structure. The discovery of the circulation of the blood, by the illustrious Harvey, was based upon his anatomical investigations of the heart and blood vessels. The valves in these organs being observed to open all in the same direction, it was inferred that the blood could flow freely only in the direction in which they opened, and it was, therefore, concluded that the blood must

circulate in the direction permitted by the valves; and subsequent experiment and observation proved this inference to be correct, and thus the functions of these organs were inferred from their anatomical structure. In the investigation of the functions of organs at the present day, a much more minute inquiry is made into their anatomical structure. Having first, as above stated, ascertained the size, form, appearance, feel and relative situation of an organ, or of all the organs of the body, you now commence the examination of each and every organ separately, and unravel the various tissues which enter into its composition; and further you analyze the composition of the different tissues themselves by calling in the aid of chemistry. This department of anatomical science is called general anatomy, or more frequently at the present day Histology. The scientific world is indebted to the labors of the ingenious Bichat, who, about the commencement of the present century, first clearly defined and demonstrated the various tissues which enter into the composition of an organ, as well as their physiology and pathology. And this constituted another *era* in the history and progress of medicine.

Take any organ, say for example, a bone or a muscle and you desire to ascertain how many tissues enter into its composition, and what these tissues are anatomically, physiologically and chemically considered, and you have some idea of the task before you, interesting, indeed, to an ingenious mind, and full of the greatest results. Let us see then what is the general anatomy or histology of a bone. A bone consists of animal and earthy matter most intimately united and arranged in concentric lamine and fibres; these are pierced by thousands of foramina and canals for the transmission of blood vessels and nerves, which course in every direction through its compact areolar structure. These canals and intercellular spaces are lined by a very delicate membrane, which secretes a medullary or fatty matter. By further investigation, aided by the microscope, one of the most beautifully arranged anatomical struc-

tures in the whole system is presented to our view. Surrounding each Haversian canal are numerous delicate lamene, concentricately arranged, between which are numerous lacunæ or corpuscles, from which radiate in all directions canaliculi, much less in diameter than a globule of blood, and through which is transmitted the osseous juice or nourishment of the bone. But this is not all, by immersing the bone into a dilute mineral acid, the earthy matter is separated from the animal matter, which retains the shape of the bone, and it is now examined freed from its earthy basis. This animal matter of bone is called gelatin, and constitutes one of the elementary substances of the body. By a further process of maceration in water this gelatinous basis of bone may be separated into fibres and lamenæ, and its nature is still further investigated by the chemist, upon whose science the anatomist is dependent for a knowledge of its ultimate elements, and their relative proportions of carbon, oxygen, hydrogen and nytrogen. In like manner the ossific basis is dealt with; the animal matter being separated by heat, the earthy matter retains the shape of the bone, and after its beautiful structure is examined by the microscope, it also is handed to the chemist for analysis, and is found to consist of various salts, the chief of which is phosphate and carbonate of lime. And thus you become acquainted with the histology of a bone. Nor is this all, its development, growth and modifications which it undergoes from infancy to old age must be studied before you can fully appreciate its anatomy; and further, you have yet to learn its physiology or vital properties, mode of nourishment and of repair, and also its pathology, consisting of a long list of varied forms of diseased action, both local and constitutional, before you can say you have a scientific knowledge of a bone.

Now, all other organs of the body must be studied in the same manner, and when we reflect how much more complex in structure and organization many of the vital organs are, and how much more difficult it is to analyze them fully and satis-

factorily, it is no wonder that Haller said, it would cost twenty years study to understand anatomy. We have said that such profound anatomical knowledge is not absolutely essential to the practitioner of medicine, nor does it generally teach us the physiology or functions of the organs; nor their pathology; nor the remedies that will cure their varied diseases. These branches of medicine must be studied by themselves, as well as collectively and in connection with anatomy, in order to understand them fully.

Anatomy is justly regarded as the basis or foundation of all medical science; but it is only the *foundation*, it is not the whole science, but bears the same relation to the other branches of medicine that the foundation of any edifice does to its walls and other structures which rest upon it. It is, therefore, a most important and essential department of medical science, to which you should give your greatest attention as being intimately connected with your future progress in medicine.

Physiology, which is the next branch of medical science to which your attention should be directed, teaches us the functions and vital properties of the anatomical structures just studied; but these functions and properties must be ascertained by experiment and observation, as they cannot, as already stated, be inferred from anatomy. The nerves of motion and the nerves of sensation present anatomically the same structure and the same chemical composition, and yet they are very different in their functions. Nor would this difference, perhaps, have yet been known, except from experiment and observation. But neither the experiment or observation could have been made without a knowledge of anatomy. Here then you see the connection, as well as the distinctness between the two departments of anatomy and physiology. This great discovery in physiological science was made by Sir Charles Bell, as well as many other interesting facts in connection with the nervous system. Further interesting facts in relation to the nerves of motion and sensation have been since established by the re-

searches of Marshall Hall of London, and designated as the excito-motory system. But let us look for a moment at the structure of the nerves of the special senses; here we find the structure of each to be different, yet if examined separately from the organs, with which they are connected, we cannot infer from the structure of the nerves that the one is especially adapted to receive the impression of light, the other that of sound, or the other that of smell; we cannot by any a priori reasoning come to such a conclusion, but the speciality of each must be ascertained by experiment and observation. But again, if the *whole organ* called the eye, or ear be thoroughly dissected, observing the relation of all the parts, as Harvey did the heart and blood vessels, then any one already acquainted with the laws of optics or acoustics would not hesitate to conclude that the eye was the organ of vision and the ear the organ of sound. The beautiful transparent media seen in the eye on dissection are so well adapted for the transmission and refraction of light, in accordance with the laws of optics, that any one would conclude it was the organ of vision. And we might here remind you of the connection that exists between the collateral sciences and the study of medicine, and how much it is facilitated by previous scientific attainments. The wonderful and beautiful organ called the eye, cannot be studied with interest or properly understood without a previous acquaintance with the laws of light. An explanation of the philosophy of vision is no more connected with its anatomy and physiology than with light. Even its pathology can be explained only in this connection. When a beam of light falls upon the transparent cornea, it is partly reflected and partly transmitted on through the chambers of the eye till it falls upon the crystalline lens, which, from the peculiar arrangement and modification of density of its lamina, is possessed not only of the power of reflecting and refracting the rays of light in their transit through it, but also with the wonderful property of correcting the refrangibility of the different rays of light or prismatic colors, so

as to cause them all to impinge with accuracy upon the retina, and thus present a perfect image of the object from which they emanated. But to accomplish this in the most perfect manner, and in order to correct the aberration of the spherisity of the lens, the pupil in the iris dilates and contracts according to the intensity of light, and gives transit only to so much as is requisite to perfect vision.

If now we stop for a moment to contemplate this exquisite structure, and its wonderful adaptation to the laws of light, as well as its capacity to express the feelings and emotions of the soul, we are truly lost in wonder and admiration. Through the small opening in the iris, called the pupil, not only is the image of one object seen, but the beauties of a whole landscape may be seen pictured on the retina at the same time. Or in the language of Arnott, in his Elements of Physics, "If at night an eye is turned up to the blue vault of heaven, there is portrayed upon the little concave of the retina the boundless concave of the sky, with every object in its just proportions. There a moon in beautiful minature may be sailing among her white edge clouds, and surrounded by a thousand twinkling stars, all in just proportion, so that to an animalcule within and near the pupil, the retina might appear another stary firmament decked in its glory."

The image of objects thus made upon the retina is conveyed by the optic nerve to the brain, where it is perceived by the mind, so that it is the mind and not the eye that sees, though *both* are essential to vision.

The same is true with regard to the other organs of sense, each being formed and adapted to the performance of its special functions and supplied with a nervous apparatus of peculiar structures and endowments, as the auditory and olfactory nerves.

But besides these peculiar endowments of the organs of sense and of the nerves of motion and sensation, there are other vital properties of the tissues. The peculiar vital property called

contractility, which is especially characteristic of muscular fiber, is wholly independent of the nerves, and *it* also was discovered by observation and experiment. It is said to have been first discovered by Glisson of England, but more fully described and descanted on by Baron Haller under the name of *vis insita* or irritability. There is another vital property which is regarded as a universal property of all living bodies. It consists in the power or capacity of self-formation from dissimilar materials, and in the development, growth and maintenance of the body. This property is manifested in the seed of a vegetable, which, when appropriately stimulated, developes itself into a plant and maintains its growth and nutrition from the surrounding inorganic elements, which it unites and converts into its own substance. And it is also manifested in the germ of the *animal*, which derives its food, not from inorganic matter but from the organized substance of seeds and plants, which it converts into its own animal substance, and endows with the capacity of motion, feeling and thought, which attributes do not belong to the vegetable substance from which it is derived.

How can we contemplate such phenomena without going farther and seeking for a *First Cause*. Thus you see, we are by the investigation of physiological science naturally led to the contemplation and existence of an Omnipotent Creator, and compelled to exclaim in ignorance, How wonderful are the works of nature!

We cannot explain how it is,—no more can the chemist explain what elective affinity is, or the philosopher what gravity is. They can explain the laws by which they are governed, and we can explain the phenomena of life, but not what life is. No satisfactory definition can be given of life.

Further investigations are, however, now being made in physiological science, based upon the great improvements made in the perfection of the microscope and chemical science. And here we might again remind you how intimately connected and dependent is medicine for its improvement upon the collateral

sciences, and, therefore, how important that the medical student should be a scientific scholar.

The improvement to which we allude has led to the most wonderful advancement in both physiology and pathology. Kölliker, in his recent work on Microscopical Anatomy, says: "In the last thirty years, particularly, discoveries have so trodden upon one another's heels, that it must be considered truly fortunate that a bond of connection has arisen and that microscopical anatomy has thus escaped the danger of becoming, as in earlier days, lost in minutiæ. In the year 1838, in fact, the demonstration by Dr. Thos. Schwann of the originally perfectly identical cellular composition of all animal organisms, and of the origin of their higher structures from these elements, afford the appropriate conception which united all previous observations, and afforded a clue for further investigations. If Bichat founded histology more *theoretically*, by constructing a system and carrying it out *logically*, Schwann has by his investigations afforded a basis of *fact*, and has thus won the second laurels in the field. Since the time of Schwann, still greater improvements have been made in regard to the genesis of the cel, the import of the nucleus, the development of the higher tissues, their chemical relations," etc. Thus you see physiology keeps pace with the improvements of the other sciences.

The next study which should occupy your attention is called pathology. Anatomy teaches us the healthy structure of the body, physiology its healthy functions, and pathology its diseased functions and morbid structure. It follows, therefore, as a necessary corollary, that anatomy and physiology must be understood before we can learn pathology. Now, there are generally reckoned two great classes of disease: Those which are called functional diseases, and those which are called structural. The functional diseases are those which are evinced by a deviation from the natural actions of the organs; which morbid actions not only produce a change in the healthy secretions, as manifested by their appearance, chemical composition, etc.,

but, also, a deviation from the natural healthy movements and sensations of the general system, as manifested by pain, languor and restlessness, and which changes from the healthy state are called symptoms. Now, in this class of diseases, upon a post-mortem examination, no structural change is found in the organs, and they appear to be healthy.

The medical philosophers, who contended for this form of disease, not being able to detect any morbid alteration in the structure of the organs after death, referred all the morbid phenomena observed during life, either to a change in the *vis vita*, or in the fluids of the body, and hence arose the two great sects of *Vitalists* and *Humoral* Pathologists. But the other great class of diseases called structural, while they are manifested by the same or similar morbid phenomena, called symptoms, which characterize the functional diseases, leave behind them evident traces of morbid action, as is evinced by change in size, form and appearance of the diseased organ when contrasted with its healthy state. Now this changed condition of the organ is called morbid or pathological anatomy, and those philosophers who contend for its existence in any case of diseased action are called Solodists. And they contend that no morbid change can take place in the functions of an organ without at the same time it is accompanied by a change of structure. Many of the ablest philosophers of former times ranked in this list. And the question to-day is an unsettled one and has yet to be determined.

Within the last thirty years the most minute investigations have been made in what is called morbid anatomy and pathology; in other words, in morbid change of the structure and functions of organs. The tissues, the blood, and the secretions have been and are now being investigated by the most scientific men with a zeal and energy never before equaled. And aided by the microscope and chemistry, and the present advanced state of histology and physiological science, they hope to establish medicine upon a solid and rational foundation.

It matters not that one thinks all medical advancement depends upon physiological accuracy, and that another is equally impressed with the idea that all rests upon pathological anatomy, including, of course, the morbid changes which occur in the blood and other fluids, which are to be investigated chiefly by chemical analysis.

Todd and Bowman, of London, in their recent and able work on the Physiological Anatomy and Physiology of man, say: "A correct physiology must ever be the foundation of rational medicine. —— Pathology is the physiology of disease, and it is obvious that no pathological doctrines can command confidence which are not founded upon accurate views of the natural functions. It is also certain that improvements in pathology must follow in the wake of advancing physiology."

But now hear Rokitansky, an equally ardent and devoted cultivator of medical science, and who is justly regarded as the ablest pathologist of the present age. He says, in the preface to his great work on Pathological Anatomy, "The present work will, at any rate, tend to show how thorough is my conviction, that pathological anatomy must constitute the ground work, not alone of all medical knowledge, but also of all medical treatment; nay, that it embraces all that medicine has to offer of positive knowledge, or at least of what is fundamental to it. Its domain will here, however, be found more extended, and more nearly approximated to the confines of pathological chemistry than has generally been the case in pathologic and anatomical writings."

He regards the "Primitive diversity in blastemata, as the only tenable basis for a humoral pathology."

Numerous authorities might be quoted to show, and indeed from our own observations we conclude, that what is termed rational medicine rests upon a scientific knowledge of anatomy, physiology and pathology. And that although each of these departments must be studied separately, and their facts be ascertained by direct experiment and observation; yet, no su-

premacy should be given to the one department over the other in the general advancement of medical science. They are but departments, which by their intimate union, constitute the scientific basis of medicine, and must be studied together, as well as separately, in order to fully understand and appreciate their reciprocal influences.

We might illustrate by example how *practical* medicine has been advanced by an increased knowledge of these scientific departments, but the limits of this discourse will not permit.

In connection with the scientific departments of medicine we have so often mentioned chemistry, that we deem it scarcely necessary to impress upon you the importance of its study as intimately connected with every department of medicine. Indeed, we have already stated, that the future progress of medical science is so dependent upon organic chemistry, that no further advance can be expected in either physiology or pathology except in connection with its wonderful and beautiful demonstrations of the relations of elementary atoms. What does Kölliker, whom we have already quoted, say on this subject? While he admits, that "our acquaintance with the elementary processes which take place during the formation of organs must be regarded as very slight;" yet he says, "The right track in clearing up these points has been entered upon, and a logical investigation of the *chemical relations of the elementary parts and of their molecular forces*, after the manner of Donders, Ludwing and others, combined with a more *profound microscopical* examination of them, such as has already taken place with regard to the muscles and nerves; further, a histological treatment of embryology, such as has been attempted by Reichert, Vogt, and myself will assuredly raise the veil, and bring us, step by step, nearer to the desired, though perhaps never to be reached, end."

In acknowledging, however, the importance of chemistry in the study of scientific medicine, we must not be led astray by purely chemical phenomena. There is a *vital force* which regulates and controls chemical combinations within the living be-

ing, which should never be lost sight of in our physiological investigations. A force already alluded to, which, inherent in the seeds of plants and the germ of animals, converts foreign materials into their own substance and which chemistry cannot accomplish.

"Attraction and chemical affinity," says Kerkes in the last edition of his physiology, "manifest themselves in acts so simple and almost uniform that the hypothesis which assumes the existence of such properties, supplies at once the language in which their laws of action may be enunciated. But in the simplest exercise of living formative power even in that which accomplishes the formation of a cell, there is evidence of the operation of many forces." And again, "Any hypothesis which would abolish the idea of vital, formative force, would be much less reasonable and useful than that which admits it." The celebrated Cuvier remarks, "that the vital cohesive affinity which exists between the living molecules of the body is preserved by a power superior to chemical affinity, which never ceases to act till the moment of death."

But there are those philosophers, however, who argue in support of a physical theory of life and organization, and who attach a much higher importance to purely chemical operations in the explanation of physiological phenomena. But without further reference at present to the importance of any one of the above named departments of medicine, it must be evident, from what has already been said, that a thorough investigation of each, as well as the intimate relation they bear to each other, constitutes the only scientific basis of rational medicine.

These departments should be studied first, and are indeed those to which the student of medicine generally gives his greatest attention during his collegiate course. He thus lays the scientific foundation which is essential to his future progress in the *practical* departments of his profession.

But here arises a most important and interesting question, and one which has given rise to much discussion among medi-

cal men. Is a knowledge of *scientific* medicine essential to the successful *practice* of medicine? Or, in other words, will a knowledge of all of the elementary branches, teach you the use and effects of calomel and quinine in fever; of tatar emetic in pneumonia, or of opium in pain? Will it enable you to infer that ipecac will vomit, or epsom salts purge? Will it teach you, in short, the use and effects of any one article of the whole materia medica? We answer, practical medicine, like scientific medicine, must be learned by experiment and observation, aided by experience. From no a priori reasoning based upon scientific principles, can you infer what will be the effects of a medicine never before used. But if you are desirous to ascertain what will be its effects, you cannot judiciously experiment and observe, in order to ascertain them, without a knowledge of the anatomy and physiology of the system upon which you experiment. It would be blind observation without this knowledge.

We are told by those who contend for observation and experience alone, as the only foundation for practical medicine, that we are indebted to the observations of a savage, (a Peruvian Indian,) for the first use of barks in the treatment of intermittent fever. To a quack, (Paracelcus,) for the first internal use of mercury. And to a German Monk (Bazel Valentine) for the use of antimony. And these, say they, are some of our most valuable remedies. Now all this we are willing to admit. And even further, as already expressed, that experiment and observation are essential to practical medicine. But are we not indebted to science for the discovery of *quinine*, the tonic and febrifuge principle of barks. And for the discovery of morphine, the sedative principle of opium, and for the various chemical combinations which render the preparations of antimony useful in medicine. No one will deny this. Hence we say, practical and scientific medicine must go together. Again, in order to treat any disease judiciously, is it not necessary to know its seat, and the symptoms which indicate it. Every one

must admit this, except those who prescribe for *symptoms alone.* And who by the by constitute even at the *present day* a large if not the largest class of practitioners. They prescribe for symptoms regardless of the local habitation and name of the disease. If there be pain, they give opium; if chills and fever, they give quinine; if constipation, they give purgatives, and whatever else experience teaches is useful; wholly regardless of the seat of the disease, and unconcerned whether it be in the blood or solids, in the liver or stomach. They care not whether the vital principle, the fluids or the solids are *primarily* affected, they prescribe for symptoms, and call themselves symptomologists. This class, I say, constitutes the largest class of practioners of the present day.

But, gentlemen, I am sure that true scientific medicine of the present day, which seeks out the *seat* of the disease, and diagnoses from the symptoms that may exist, its nature, at least so far as functions and structure are concerned, must and does lead to the *most successful practice.* Similar symptoms arise from very dissimilar forms of disease. *Symptomatic* fever, for example, is a common attendant upon many different forms of disease, and different localities of disease. Gastritis, pneumonitis and phrenitis will all give rise to fever. But will you treat the fever consequent upon each of these affections alike? Certainly not. But when you treat symptoms alone, which in each of these instances are nearly the same, without diagnosing the seat of the disease, and understanding the influences which the organ affected exercises in the animal economy, how can you use remedies judiciously. It is impossible. And it is equally impossible that you can diagnose the seat of the disease without a knowledge of scientific medicine, in other words, without a knowledge of anatomy, physiology and pathology. No knowledge of materia medica, or the use of remedies will teach you that the liver is in the right side and below the diaphragm; nor its functions or influence in the general economy; nor the symptoms which indicate its diseases. These must be

learned from anatomy and physiology, and hence in as much as the diagnosis of a disease is regarded by all as essential to its successful treatment, we must again conclude that *scientific* and *practical* medicine must go together.

"Every problem," says the late learned Dr. Parris, of London, "which involves the phenomena of life is invariably embarrassed by circumstances, so complicated in their nature and fluctuating in their operation as to set at defiance every attempt to appreciate their influence. Thus an observation or experiment upon the effects of a medicine is liable to a thousand fallacies, unless it be carefully repeated under the various circumstances of health and disease in different climates and on different constitutions."

"Experience is fallacious and judgment difficult," says Hippocrates. We cannot believe then with those authors who maintain, "that rude experience or pure observation of the sensible effects of remedies is the fundamental basis of practical medicine." But rather we believe with Carpenter, who says, that "in proportion as our treatment of disease loses its empirical character, and is founded on scientific principles, must it increase in perfection and success; and in like proportion will the medical profession acquire that dignity to which the nobility of its objects entitles it, and that general estimation which will result from the enlightened pursuit of them."

We might go on to illustrate by many examples the connection and dependance of practical upon scientific medicine; but this will be so fully illustrated during the present session, by the professors who occupy the chairs of practical medicine, that we must refer you to them.

In conclusion then, gentlemen, let me impress upon you, that the study of medicine is arduous and laborious; but let your determination be now fixed and governed by a worthy emulation and ambition; give your whole time and soul to its investigation; set high your mark, and resolve to reach it. Think of the names of Hippocrates, of Galen, Haller, Harvey, Hunter,

Rush, Physic, and a long list of others, whose names are imperishable, and ask, Who is to fill their places? Who is to trasmit to coming generations a still greater improvement in medical science? I do hope there are many here to night in this large class, representing as it does the talents and genius of the whole South-West, who at least will try; and if persistent and persevering to the end, may become a blessing to humanity and an honor to their country.